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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/677,558	09/29/2000	Gi-Young Jeun	29347/990488	1618
7590	12/15/2003		EXAMINER	
Marshall O'Toole Gerstein Murray & Borun 6300 Sears Tower 233 South Wacker Drive Chicago, IL 60606-6402			NGUYEN, DILINH P	
			ART UNIT	PAPER NUMBER
			2814	
DATE MAILED: 12/15/2003				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/677,558	JEUN ET AL.
	Examiner	Art Unit
	DiLinh Nguyen	2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 11 September 2003.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-6 and 8-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-6 and 8-11 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Drawings

The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 9/11/03 have been disapproved because they introduce new matter into the drawings. 37 CFR 1.121(f) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing of Brief or Detailed Description of Figs. 4-5. The original drawings and disclosure disclose only Brief and Detailed Description of Figs. 1-3.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the heat sink is adhered to at least one of the lead frame and the sealer with an adhesive; and the heat sink and the sealer are connected to each other by means of the grooves or the rings must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 8-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Regarding claim 8, the phrase: "...the heat sink is adhered to at least one of the lead frame with an adhesive..." is not understood. The drawings fail to show the heat sink is adhered to at least one of the lead frame with an adhesive.
- Regarding claim 10, the phrase: "...the heat sink and the sealer each have grooves or rings and wherein the heat sink and the sealer are connected to each other by means of the grooves or the rings..." is not understood. The drawings fail to show the heat sink and the sealer each have grooves or rings.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-2, 4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) in view of Ohno et al. (U.S. Pat. 5227662).

Mehr discloses a semiconductor package (fig. 1, column 2, lines 30 et seq.) comprising:

a lead frame 18 having a first portion at a first level, a second portion surrounding the first portion at a second level, and a plurality of terminals connected to the second portion;

a power circuit 12 mounted on a first surface of the first portion;
a heat sink 22, wherein the heat sink directly contacts a second surface opposite
the first surface of the first portion of the lead frame; and
a sealer 16 having an electrically insulating property that covers the package.

Mehr fails to disclose the heat sink having an electrically insulating property and thermal conductivity.

Ohno et al. disclose SiC and AlN can be selected as the material of a heat sink 40 (cover fig., column 5, lines 44-45); therefore, the heat sink having an electrically insulating property and thermal conductivity. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr to provide a good electrical insulation property and low cost for the semiconductor package, as shown by Ohno et al.

- Regarding claim 2, Mehr discloses the first portion of the lead frame is centrally positioned within the lead frame.
 - Regarding claim 4, Mehr discloses the first surface of the first portion is a top surface and wherein the second surface of the first portion is a bottom surface.
 - Regarding claim 11, Ohno et al. discloses the heat sink 40 is sheet shaped and comprises at least one compound selected from the group consisting of AlN (cover fig., column 5, lines 44-45).
3. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) in view of Ohno et al. (U.S. Pat. 5227662) and further in view of Majumdar et al. (U.S. Pat. 5703399).

- Regarding claims 3 and 5, Mehr and Ohno et al. fail to disclose the package comprising a control circuit that drives the power circuit.

Majumdar et al. disclose a semiconductor device (fig. 9, column 11, lines 19-48) comprising:

a lead frame 3 having a first portion at a first level, a second portion surrounding the first portion at a second level, and a plurality of terminals 15 and 17 connected to the second portion;

a power circuit 9 includes a power semiconductor element 4a; and
a control circuit 8 that drives the power circuit.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr and Ohno et al. to provide the control circuit that drives the power circuit and the noise resistance of the control circuit can be enhanced, as shown by Majumdar et al.

4. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) in view of Ohno et al. (U.S. Pat. 5227662) and further in view of McCarthy et al. (U.S. Pat. 3956726).

Mehr and Ohno et al. fail to disclose the module further comprising a heat detection circuit.

McCarthy et al. disclose a device comprising a heat detection circuit (column 1, lines 39-42) to detect over heating for the device. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to

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modify the device of Mehr and Ohno et al. to provide a heat detection circuit to detect over heating for the device, as shown by McCarthy et al.

5. Claim 8, in so far as it is understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) and Ohno et al. (U.S. Pat. 5227662) in view of Tomita et al. (U.S. Pat. 5440169).

Mehr and Ohno et al. fail to disclose the heat sink is adhered to at least one of the lead frame and the sealer with an adhesive.

Tomita et al. disclose a semiconductor package (fig. 8, column 5, lines 35-60) comprising:

a heat sink 30 is adhered to at least one of the lead frame and a sealer 6 with an adhesive of a plurality of dimples 25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr and Ohno et al. to improve the molding characteristics for the semiconductor package, as shown by Tomita et al.

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) and Ohno et al. (U.S. Pat. 5227662) in view of Tomita et al. (U.S. Pat. 5440169) and further in view of Majumdar et al. (U.S. Pat. 5703399).

Mehr, Ohno et al. and Tomita et al. fail to disclose the adhesive contains a filler that includes at least one compound selected from the group consisting of Al₂O₃, AlN and BeO.

Majumdar et al. disclose a highly heat conducting resin 2, wherein the adhesive contains a filler that includes at least one compound selected from the group consisting

of AlN (column 8, lines 22-34). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr, Ohno et al. and Tomita et al. to provide a highly heat conducting resin with an excellent electric insulating property and thermal conductivity, as shown by Majumdar et al.

7. Claim 10, in so far as it is understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Mehr (U.S. Pat. 5530295) in view of Ohno et al. (U.S. Pat. 5227662) and further in view of Park et al. (U.S. Pat. 6239487).

Mehr and Ohno et al. fail to disclose the heat sink and the sealer are connected to each other by means of the grooves or the rings.

Park et al. disclose a semiconductor device comprising: a heat sink 3b and a sealer 10 each have grooves or recesses 3-3 and wherein the heat sink and the sealer are connected to each other by means of the grooves or recesses (fig. 4B, column 4, lines 15-20). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Mehr and Ohno et al. to increase the contact area with the sealer and also to increase a heat dissipation capability of the package, as shown by Park et al.

Response to Arguments

Applicant's arguments with respect to claims 1-6 and 8-10 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (571) 272-1712. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN

December 4, 2003

[Handwritten signature]